IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appl. No.	:	10/566,802
Conf. No.	:	8048
Applicant(s)	:	TOBIAS GEORG TOLLE ET AL.
Filed	:	30 January 2006
TC/A.U.	:	2838
Examiner	:	BAO Q. VU
Atty. Docket	:	DE-030258
Title	:	HIGH FREQUENCY CONTROL OF A SEMICONDUCTOR SWITCH

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

APPEAL BRIEF

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(i) Real Party in Interest

The real party in interest is Koninklijke Philips Electronics N.V., a corporation of The Netherlands having an office and a place of business at Groenewoudseweg 1, Eindhoven, Netherlands 5621 BA.

(ii) Related Appeals and Interferences

To the best of Appellants' knowledge and belief, there are no related appeals or interferences.

(iii) Status of Claims

Claims 1-9 stand finally rejected by the Examiner.

(iv) Status of Amendments

There was one Response filed on 3 December 2007, after final rejection of the claims on 3 October 2007, this Response having been considered by the Examiner.

(v) Summary Of Claimed Subject Matter

It should be explicitly noted that it is not the Applicants' intention that the currently claimed methods and control circuits be limited to operation within the below illustrative methods and control circuits beyond what is required by the claim language. Further description of the illustrative methods and control circuits is provided indicating portions of the claims which cover the illustrative methods and control circuits merely for compliance with requirements of this appeal without intending any further interpreted limitations be read into the claims as presented.

The present invention, for example as claimed in claim 1, relates to a method of operating a resonant driver circuit for driving a semiconductor switch. FIG. 1 shows an example of a circuit for performing this method. The driver circuit includes a first switch T1, for connecting a power supply 2 (Vcc) via an inductor 16 to a control terminal (gate of MOSFET 20) of the semiconductor switch 20. The driver circuit further includes a second switch T4 connected to the control terminal of the semiconductor switch 20 for controlling a switching of the semiconductor switch 20 (e.g., see, paragraphs [0024], [0025]). The method includes pre-charging the inductor 16 by current flowing from the first switch T1 across the inductor 16 to the second switch T4 or current flowing from the second switch T4 across the inductor 16 to the first switch T1 before a switching of the second switch T4 (e.g., see, paragraphs [0035] [0036], [0037] and FIG. 3).

(vi) Grounds of Rejection to be Reviewed on Appeal

Whether claims 1-5 and 7-9 of U.S. Patent Application Serial No. 10/566,802 are anticipated under 35 U.S.C. §102(b) by U.S. Patent No. 5,264,736 to Jacobson ("Jacobson") and whether claim 6 of U.S. Patent Application Serial No. 10/566,802 is obvious under 35 U.S.C. §103(a) over Jacobson in view U.S. Patent No. 6,441,673 to Zhang ("Zhang").

The Appellants respectfully wish the Board to address the patentability of independent claims 1 and 8, and further claims 2-7 and 9, as depending on respective claims 1 and 8, based on the requirements of claim 1. This position is provided for the specific and stated purpose of simplifying the current issues on appeal. However, the Appellants herein specifically wish to reserve the right to argue and address the patentability of each of the further claims at a later date should the separately patentable subject matter of those claims later become an issue. Accordingly, this limitation of the subject matter presented for appeal herein, specifically limited to discussions of the patentability of claim 1, is not intended as a waiver of Appellants' right to argue the patentability of the further claims and claim elements at that later time.

(vii) Arguments

Jacobson

Jacobson is directed to metal oxide semiconductor field effect transistor (MOSFET) resonant gate driver circuit 10 having a large inductor 18 coupled between and in series with two switching transistors 14 and 16 respectively. The two switching transistors 14 and 16 connect via the inductor to a power MOSFET 26 (see, Abstract, FIG. 1). FIGs. 2 and 3 of Jacobson are merely equivalent circuit diagrams for turn-on and turn-off, respectively, of the power MOSFET 26 shown in FIG. 1.

In Jacobson, when MOSFET switch 14 turns on as shown in FIG 2, current iq1 from the MOSFET switch 14 flows towards the inductor 18 and current idq2 from MOSFET switch 16 flows towards the inductor 18 (see, FIG 2). When MOSFET 16 turns on as shown in FIG 3, current iq2 flows towards the MOSFET switch 16 and current idq1 flows towards MOSFET switch 14 (see, FIG 3).

In either case in Jacobson, current is either flowing from both switches towards the inductor 18 or from the inductor to both switches. In Jacobson, the current is not flowing from the first switch across the inductor to the second switch or from the second switch across the inductor to the first switch as required by claim 1 of the present application.

Response to Arguments Presented in Final Office Action

In a Response to Arguments section contained on Page 3 of the Final Office Action, Col. 5, lines 32-52 of Jacobson are cited for showing the features of claim 1, however, it is respectfully submitted that reliance on these sections or any portions of Jacobson for that matter is misplaced.

While it is undisputed that the cited section of Jacobson shows the current is flowing from the first switch 14 (see, Col. 5, lines 40-42) across inductor 18 (see, Col. 5, lines 44-45) before the switch 16 is turned on (see, Col. 5, lines 49-52), yet this is insufficient in terms of what is substantially recited in the claims, and particularly claim 1 which recites "pre-charging the inductor by current flowing from the first switch across the inductor to the second switch ... before a switching of the second switch." In Jacobson, no current is flowing to the second switch (MOSFET 16) since Q2 is off (see, FIG. 2) and the diode DQ2 is open until the time that DQ2 becomes forward biased and begins conducting iDQ2. MOSFET 16 is effectively an open circuit prior to the time when DQ2 starts to conduct so current iQ1 can not be said to be flowing from MOSFET 14 to the MOSFET 16 (in terms of Jacobson).

Accordingly, It is respectfully submitted that the method of Claim 1 is not anticipated by the teachings of Jacobson. For example, Jacobson does not disclose or suggest, a method that amongst other patentable elements, comprises (illustrative emphasis provided) "pre-charging the inductor **by current flowing from the first switch across the**

inductor to the second switch or from the second switch across the inductor to the first switch before a switching of the second switch" as required by claim 1 and as substantially required by claim 8.

This feature is nowhere disclosed or suggested in Jacobson. In Jacobson, MOSFET 16 (second switch in terms of claim 1, for example) is effectively an open circuit (e.g., Q2 off and DQ2 back biased) when MOSFET 14 (first switch in terms of claim 1, for example) is conducting current until DQ2 becomes forward biased. Zhang is cited to allegedly show features of dependent claim 6 and does not remedy the deficiencies in Jacobson.

Based on the foregoing, it is respectfully submitted that independent claims 1 and 8 are patentable over Jacobson alone and in combination with Zhang.

(viii) CONCLUSION

Claims 1-9 are patentable over Jacobson alone and in combination with Zhang.

Based on the above arguments, Appellants believe that the subject invention is not anticipated or rendered obvious by the prior art and is patentable thereover. Therefore, Appellants respectfully request that this Board reverse the decisions of the Examiner rejecting claims 1-9 and allow this application to pass on to issue.

Respectfully submitted,

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(ix) Claims Appendix

1. A method of operating a resonant driver circuit for driving a semiconductor switch, wherein the driver circuit includes a first switch for connecting a power supply via an inductor to a control terminal of the semiconductor switch and a second switch connected to the control terminal of the semiconductor switch for controlling a switching of the semiconductor switch, the method comprising the step of:

pre-charging the inductor by current flowing from the first switch across the inductor to the second switch or from the second switch across the inductor to the first switch before a switching of the second switch.

2. The method of claim 1, wherein the semiconductor switch is a voltage controlled switch wherein the inductor is pre-charged by building up an inductor current prior to the switching of the second switch.

3. The method of claim 2, wherein the inductor current is built up by providing a time period, during which the first switch and the second switch are switched on.

4. The method of claim 3, wherein the semiconductor switch has an input capacitance at its control terminal; and wherein the initial current allows for a fast switching of the semiconductor switch.

5. The method of claim 2, wherein the pre-charging is performed such that the inductor current reaches approximately half of its peak-value before the switching of the second switch.

6. The method of claim 1, wherein the driver circuit further comprises:

a third switch arranged between a power supply voltage and a first end of the inductor;

a fourth switch arranged between ground and the first end of the inductor;

a fifth switch arranged between the power supply voltage and a second end of the inductor, wherein the second end of the inductor is connected to the gate of the MOSFET;

the second arranged between ground and the second end of the inductor; wherein a capacitance is arranged between the second end of the inductor and ground;

wherein the second switch is kept on for a first period of time after the third switch was switched on, and such that, for switching the MOSFET off, the fifth switch is kept on for a second period of time after the fourth switch was switched on.

7. The method of claim 1, wherein the semiconductor switch is a MOSFET.

8. A control circuit for operating a resonant driver circuit for driving a semiconductor switch, wherein the driver circuit includes a first switch for connecting a power supply via an inductor to a control terminal of the semiconductor switch and a second switch connected

to the gate of the semiconductor switch for controlling a switching of the semiconductor switch, the control circuit comprising: a switch controller for controlling the switching of the first and second switches such that the inductor is pre-charged by current flowing from the first switch across the inductor to the second switch or from the second switch across the inductor to the first switch before a switching of the second switch.

9. The control circuit of claim 8, wherein the inductor is pre-charged by building up an inductor current previous to the on-switching of the second switch by controlling the switching of the first and second switches by the switch controller such that the second switch is switched on before the first switch is switched off.

(x) Evidence Appendix

There is no evidence which had been submitted under 37 C.F.R. 1.130, 1.131 or 1.132, or any other evidence entered by the Examiner and relied upon by Appellant in this Appeal.

(xi) Related Proceedings Appendix

Since there were no proceedings identified in section (ii) herein, there are no decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 C.F.R. 41.37.